

### 4.3 FLOODING

**CPRI SCORE = 2.85**

#### Description and History

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Ice jam flooding occurs when pieces of floating ice carried by the streams current accumulate at an obstruction to the stream. The water held back can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can then occur downstream as well. A log jam is an accumulation of large woody debris (usually logs more than four inches in diameter and over six feet long) that can span an entire stream or river channel. When the jam is large enough water can accumulate upstream of the jam which will cause flooding. Once a log jam releases, downstream flooding may occur. The Flathead, Stillwater and Whitefish Rivers all have had significant log jams in the past and it can be assumed they will occur again in the future.

It is estimated that flooding causes 90 percent of all property losses from natural disasters in the United States and kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage to the structure and systems of a building.

The NWS provides short-term forecasts and warnings of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and flooding. A “watch” is issued when conditions are favorable for severe weather in or near the watch area. A “warning” is issued when the severe weather event is imminent or occurring in the warned area. Warning and Advisory Criteria for flooding is presented below.

**Flash Flood Warning:** Flooding is imminent, water levels rise rapidly with inundation occurring in less than 6 hours.

**Flood Warning:** Flooding is expected to occur more than 6 hours after the causative event.

The most severe flooding in Flathead County usually occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. On rare occasions, ice jams result in some overbank flooding. In addition to flooding along streams, shallow flooding periodically occurs in other isolated, developed areas of the county due to other factors. The mountains can receive several hundred inches of snow annually. Low flows in the basin occur naturally during the winter months, and floods normally occur in

the spring during periods of rapid snowmelt. Runoff from snowmelt, occasionally combined with rainfall, provides high stream flows in the spring.

According to the Flathead County Growth Policy (2012), the Flathead Valley has experienced six severe flood events. These occurred in 1894, 1926, 1948, 1964, 1975 and 1995. Presidential Disasters due to flooding were declared in Flathead County in 1975, 1996, 1997, and 2011. Statewide flood emergencies were declared in 1978, 1981, 1984, 1986, 1997, 1998, 2003 and 2013 (DMA, 2013).

A description of several flood events in Flathead County from the Flathead County Flood Insurance Study (FEMA, 2013) is presented below.

**1964 Flood** - Rain-swollen Bear Creek swept down from the Continental Divide to obliterate large sections of U.S. Highway 2. What once was a timbered valley along Bear Creek was now a wide gravel and rock trough (Hungry Horse News). Extremely high runoff in the Middle Fork Flathead River drainage basin caused extensive damage to highways and railroads in narrow valleys along the southern edge of Glacier National Park. A steel bridge on U.S. Highway 2 across the river at the unincorporated community of Essex was washed away. In the Nyack Flats area downstream of Essex, 30 residents were evacuated by air. It was reported that one of the homes and some barns at Nyack had only roofs above water. Farther downstream along Middle Fork Flathead River at West Glacier, the main highway bridge to the west entrance of Glacier National Park was damaged beyond repair. An old, low single arch concrete bridge was completely submerged, but the arch was not seriously damaged. Downstream from West Glacier, a rock canyon constricted flow, and for a time, part of the river flowed upstream along McDonald Creek into Lake McDonald in Glacier National Park. Flow of South Fork Flathead River was completely regulated at Hungry Horse Dam which saved the community of Columbia Falls. Even with one of the three forks regulated, there was extreme flooding in the Flathead River Basin upstream from Flathead Lake..." Almost beyond comprehension is the devastating flood damage to residents of the Flathead Valley along the banks of the Flathead River and the hundreds of people living in the Evergreen area. The flood parallels that of 1948 when the same area was flooded" (Kalispell News). Flathead County suffered \$28.4 million in damages, according to the Daily Interlake. Hundreds of homes flooded, especially in Evergreen and around Columbia Falls. From Essex to Flathead Lake, five bridges were ruined, six miles of railroad track and 20 miles of U.S. Highway 2 were destroyed.

**1975 Flood** - More than 200 trailer homes were either flooded or pulled from high-water areas, particularly at Spruce Park (Evergreen area) which ended up under more than four feet of water. About 50 residences in the Evergreen area were surrounded by rising waters (Kalispell Weekly News). In addition to the Flathead River Valley flooding, severe flows and damage were experienced along Bear Creek and Middle Fork Flathead River in 1975. Five homes were inundated and the county road was damaged near the West Glacier Golf Course. Rushing water also collapsed the old bridge near the Glacier National Park Headquarters.

**1997 Flood** - In 1997, snowmelt flooding caused numerous road closures and road washouts throughout the region. At least three road washouts were reported and one bridge was damaged. At least 50 homes were flooded, mainly along Ashley Creek and the Stillwater, Swan, and Whitefish Rivers. Fifty (50) people were isolated along Truman Creek, which washed out an access road.

**2005 Flood** – In 2005, a home was flooded from Hemlar Creek over topping its banks. Other creeks that flooded were Krause and Handkerchief where homes were also threatened by high water. Flooding of low lying areas was reported near Swan Lake. In Big Fork Bay, the combination of high creek flows and high water in Flathead Lake caused rising water and minor damage to docks in the bay. In Glacier National Park, the Going to the Sun Road was closed due to rockslides from heavy rainfall.

#### Vulnerability and Area of Impact

According to the Flathead County Growth Policy (2012), the presence of floodplain in Flathead County is an impediment to growth and development. The relatively flat terrain of the valley floor manifests itself in the sinuous nature of the rivers that wind through the valley to Flathead Lake. Glacier outwash underlies most of the area in the Flathead River Valley and forms floodplains and terraces adjacent to the Flathead River and its tributaries. Most of the floodplain is located along the Flathead River corridor between Columbia Falls and Flathead Lake. Areas of 100-year floodplain are present along the Stillwater and Whitefish Rivers.

Residents living closer to the center of the valley commonly access a shallow alluvial aquifer, often referred to as the Evergreen Aquifer. The Evergreen Aquifer is located between the Flathead River to the east and Whitefish River to the west, and between Badrock Canyon to the north and the confluence of the Flathead and Whitefish rivers to the south. The depth to water table in this area is generally less than 50 feet and, for much of the area, less than five feet.

According to the Flathead County Growth Policy (2012), a significant amount of area with seasonally high ground water and/or frequent flooding can be found throughout the Flathead River corridor and the valley bottom, which is experiencing development pressure. Much of the development south of Kalispell in the Lower Valley area is occurring where the depth to groundwater is less than 15 feet. Homes being constructed in this area are on individual water and septic systems which have the potential to impact water quality.

Development in floodplains results in a concurrent risk of property damage due to floods and impacts on city services for risk protection during flood season. **Figure 7 and 7A through 7C** present the flood-prone areas within Flathead County, Columbia Falls, Kalispell, and Whitefish, respectively. These maps were developed from digital flood insurance rate maps (DFIRMs).

### *Flood Protection Measures*

As of the 2013 Continuing Eligibility Inspection, Flathead County has six levees on the Flathead River that are included in the U.S. Army Corp of Engineers (USACE) PL84-99 Rehabilitation and Inspection Program and considered active under the requirements of that program. The six levees are Edmiston, El Rancho, El Rancho East, Lybeck, Pressentine and Steel Bridge. These levees are inspected every two years by the USACE and Flathead County performs maintenance and repair work to keep these levees in the PL84-99 Program. In 2013 a seventh levee that had previously been active under the PL84-99 program (Pederson Levee) was voluntarily withdrawn from the program by Flathead County because the work required by the USACE to maintain the levee as active in the program after the 2011 inspection was cost prohibitive. Other levees in Flathead County are not maintained by Flathead County at this time.

The Whitefish River has no manmade flood protection structure near Whitefish. However, the naturally occurring high banks through the town provide adequate flood protection. Whitefish Lake provides flood storage detention and some flow regulation along Whitefish River near Whitefish (FEMA, 2013).

Dams and reservoirs that affect the Flathead River Valley flooding are Hungry Horse Dam and Reservoir on South Fork Flathead River and Kerr Dam on Flathead Lake on Flathead River.

Stillwater River has several small lakes which are capable of providing some flood detention in the upper reaches of the watershed. Just north of Kalispell, there is a dike running along the left bank (looking downstream) of Stillwater River in the area of the golf course. This dike has changed physical dimensions several times due to recreational development in the area. This dike is not certified and is not reflected on the FIRM. Along Stillwater River, there are other minor flood protection features, which are intended to reduce overbank flooding and stabilize streambanks (FEMA, 2013).

### *Floodplain and Floodway Management*

The National Flood Insurance Program (NFIP) encourages local governments to adopt “sound” floodplain management programs to reduce private and public property losses due to floods. Flathead County and the incorporated communities participate in the NFIP. **Table 4.3-1** presents statistics on flood insurance policies and losses.

TABLE 4.3-1 NATIONAL FLOOD INSURANCE PROGRAM STATISTICS (THROUGH 12/31/2013)				
Jurisdictions	Policies in Force	Insurance in Force	Number of Losses	Total Payments
Flathead County	584	\$134,440,800	6	\$528,914
City of Columbia Falls	8	\$1,263,300	96	\$110,829
City of Kalispell	41	\$10,316,400	9	\$11,085
City of Whitefish	106	\$9,373,600	1	\$0

Source: FEMA, 2014. <http://bsa.nfipstat.fema.gov/reports/1011.htm#MTT>;  
<http://bsa.nfipstat.fema.gov/reports/1040.htm#30>

Many of the flood prone areas in Flathead County are covered by Flood Insurance Rate Maps (FIRMs), developed by FEMA. These maps show areas of 100-year Special Flood Hazard Areas, commonly referred to as 100-year floodplains in the County. FEMA has not identified all of the floodplains in Flathead County, but most of the Flathead, Whitefish and Stillwater River corridors and the valley bottoms have been mapped and shown on the FIRMs. Approximately 12 percent of the valley area of Flathead County is designated as 100-year floodplain. An additional 2 to 3 percent of the valley bottom is designated as 500-year floodplain. A Flood Insurance Study produced by FEMA of Flathead County was updated 2013.

Flathead County and the incorporated communities passed Floodplain and Floodway Management Ordinances to comply with the Montana Floodplain and Floodway Management Act and to ensure compliance with requirements for continued participation in the National Flood Insurance Program. The floodplain ordinances identify land use regulations to be applied to all identified 100-year floodplains within local jurisdictions.

According to DNRC, there are no repetitive loss properties in Flathead County or the communities of Columbia Falls, Kalispell, or Whitefish. A repetitive loss property is any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling ten-year period, since 1978. There are no severe repetitive loss properties in Flathead County or the incorporated communities. Severe repetitive loss properties have had at least four NFIP claim payments over \$5,000 each and the cumulative amount exceeding \$20,000; or, where at least two separate claim payments have been made with the cumulative amount exceeding the market value of the building.

The NFIP's Community Rating System (CRS) recognizes community efforts (beyond minimum standards) by reducing flood insurance premiums for the community's property owners. CRS discounts on flood insurance premiums range from 5 percent up to 45 percent. Those discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood. To participate in the CRS, a community can choose to undertake some of the 18 public information and floodplain management activities. Based on the total number of points a community earns, the CRS assigns you to one of ten classes. Your discount on flood insurance premiums is based on your class.

Flathead County participates in the CRS and has a rating of “8” which provides a 10 percent discount on flood insurance premiums.

### Probability and Magnitude

Flood listings with associated property damage from the SHELDUS database and Montana DES database of State and Federal disaster declarations are presented in **Table 4.3-2**.

TABLE 4.3-2 FLATHEAD COUNTY FLOOD EVENTS WITH DAMAGES					
Date	Injuries	Fatalities	Property Damage	Crop Damage	Source
1948	-	-	\$9,706,059	-	Flood Insurance Study
1964	-	-	\$184,869,097	-	Flood Insurance Study (damage west of Continental Divide)
3/17/1969	0	0	\$5,525	-	SHELDUS
7/21/1970	0	0	-	\$148,765	SHELDUS
1975	-	-	\$8,695,762	-	Flood Insurance Study
2/24/1986	0.04	0.04	\$42,844	-	SHELDUS
7/12/1989	0	0	\$2,349	\$2,349	SHELDUS
11/11/1989	0	0	\$313,189	-	SHELDUS
7/5/1990	0	0	\$8,926	\$8,926	SHELDUS
11/24/1990	0	0	\$22,314	-	SHELDUS
6/6/1995	0	0	\$178,518	-	SHELDUS
2/7/1996	0	0	\$155,863	-	SHELDUS
5/1/1997	0	0	\$302,647	-	SHELDUS; NCDC
5/26/1998	0	0	\$20,708	-	SHELDUS
7/19/2004	0	0	\$24,623	-	SHELDUS; NCDC
6/2/2005	0	0	\$208,568	-	SHELDUS; NCDC
11/5/2006	0	0	\$8,122,083	-	SHELDUS; NCDC
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>\$212,679,075</b>	<b>\$160,040</b>	

Source: SHELDUS, 2013 (adjusted to 2014 dollars); NCDC, 2014; DES, 2013

The DFIRM-generated flood hazard layer is shown on **Figures 7 and 7A through 7C** for the County and incorporated communities. The flood hazard area was intersected with the critical facility and MDOR parcel datasets using GIS (**Table 4.3-3**). Vulnerable population was calculated based on the percentage of flood risk area in each census block. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.15 (Tables 4.15-1 through 4.14-5)*. The *Flooding Section* in **Appendix C** presents supporting documentation from the risk assessment.

The GIS analysis indicates that 68,332 acres in Flathead County are located in the flood hazard area including 2,103 residences, 95 commercial, industrial and agricultural buildings, and 4 critical facilities or locations where vulnerable populations reside. It should be noted, however, that the analysis methods used may indicate more structures and value at risk than in actuality because the data does not

distinguish where on the parcel the structures are located and structures on any parcel “clipped” by the hazard area are assumed to be at risk.

Based on the frequency of past events, the probability of flooding in Flathead County is rated as “likely”; an event that may occur more than once per decade but not every year.

### Future Development

Floodplain regulations exist in Flathead County and the cities of Columbia Falls, Kalispell, and Whitefish. These regulations basically preclude new structural development within areas classified as designated floodways under state law. Floodplain provisions in the Flathead County Subdivision Regulations, as well as subdivision regulations for Columbia Falls, Kalispell and Whitefish, stipulate that land located in the 100-year floodplain or deemed subject to flooding shall not be subdivided for building or residential purposes. Building in the 100-year floodplain requires state, federal, and local permits and buildings must be elevated two feet above the base flood elevation with no basements. There are no restrictions for building in the 500-year floodplain. The Subdivision Regulations also provide standards for flood hazard evaluation in subdivision review.

Subdivision regulations for the City of Columbia Falls have provisions for high groundwater. Surface areas where monitored groundwater elevations in four feet or less to the surface, generally from March 15 through June 30, cannot be subdivided for residential or development purposes unless public sewer service is available or a property engineered private community waste water treatment system is constructed.

The Flathead County Growth Policy (2012) includes two goals and several policies to address the flood hazard:

*Restrict development on lands that pose an unreasonable risk to the health, safety and general welfare of all Flathead County residents.*

- Discourage high density development within the 500-year floodplain.
- Discourage development within the 100-year floodplain that displaces floodwaters to neighboring properties.
- Encourage impact-mitigated development in areas of shallow groundwater. Use test holes or bore holes and best available data to determine areas of shallow groundwater.

*Preserve and protect floodplains to ensure the safety of residents from flood hazards and to prevent the degradation of water quality and critical wildlife habitat.*

Adopt FEMA maps and existing floodplain studies as they become available.

- Review and revise floodplain regulations as necessary. Consider appropriate setback requirements from floodplain.

- Discourage development in floodway or floodway fringe that may result in a net increase in the floodplain area.
- Consider density guidelines in the floodplain regulations.
- Discourage development that displaces floodwaters within the 100-year floodplain.

The Flathead River to the east along with the Whitefish River and Stillwater River create a significant amount of area that is restricted to development because it lies in the 100-year floodplain. Whenever any type of fill is proposed in the 100-year floodplain, a floodplain development permit is required to be obtained in accordance with the NFIP. The City of Kalispell's Floodplain Development Permit Implementation Strategy is:

- Continue to participate in the NFIP to keep flood insurance rates low for all the residents of the community.
- Discourage fill in the 100-year floodplain when other viable options are available for development.
- Do not allow the creation of new subdivision lots in the 100-year floodplain when fill would be required to establish a building site.

The City of Kalispell Growth Policy (2003) has one goal, and several policies and recommendations that address the flood hazard:

*Development near environmentally sensitive areas should be accomplished so that these features are left in a relatively undisturbed state.*

- Development in environmentally sensitive areas including 100-year floodplain, wetlands, riparian areas, shallow aquifers and on steep slopes may pose inherent development limitations and design should be managed to avoid and mitigate environmental impacts and natural hazards.
- Filling of wetlands and the 100-year floodplain should be avoided.
- Development should be designed to avoid the loss and minimize impacts to environmentally sensitive areas including the 100-year floodplain, wetlands, riparian areas and shallow aquifers.

Recommendations:

- The City should coordinate with the County in developing a community-wide drainage plan encompassing the city and surrounding suburbs, to reduce water pollution and flooding.
- Coordinate regulatory programs involving floodplain, habitat and water quality.
- Maintain the integrity of environmentally sensitive areas in order prevent flooding, maintain high water quality and prevent soil erosion.
- Identify areas of the 100-year floodplain and other areas with limited development potential that may be suitable for future park development.

The City of Columbia Falls Growth Policy (2013) recognizes that floodplains present development limitations in the eastern portion of their planning area where the Flathead River creates a large floodplain area. Growth policies and recommendations include:

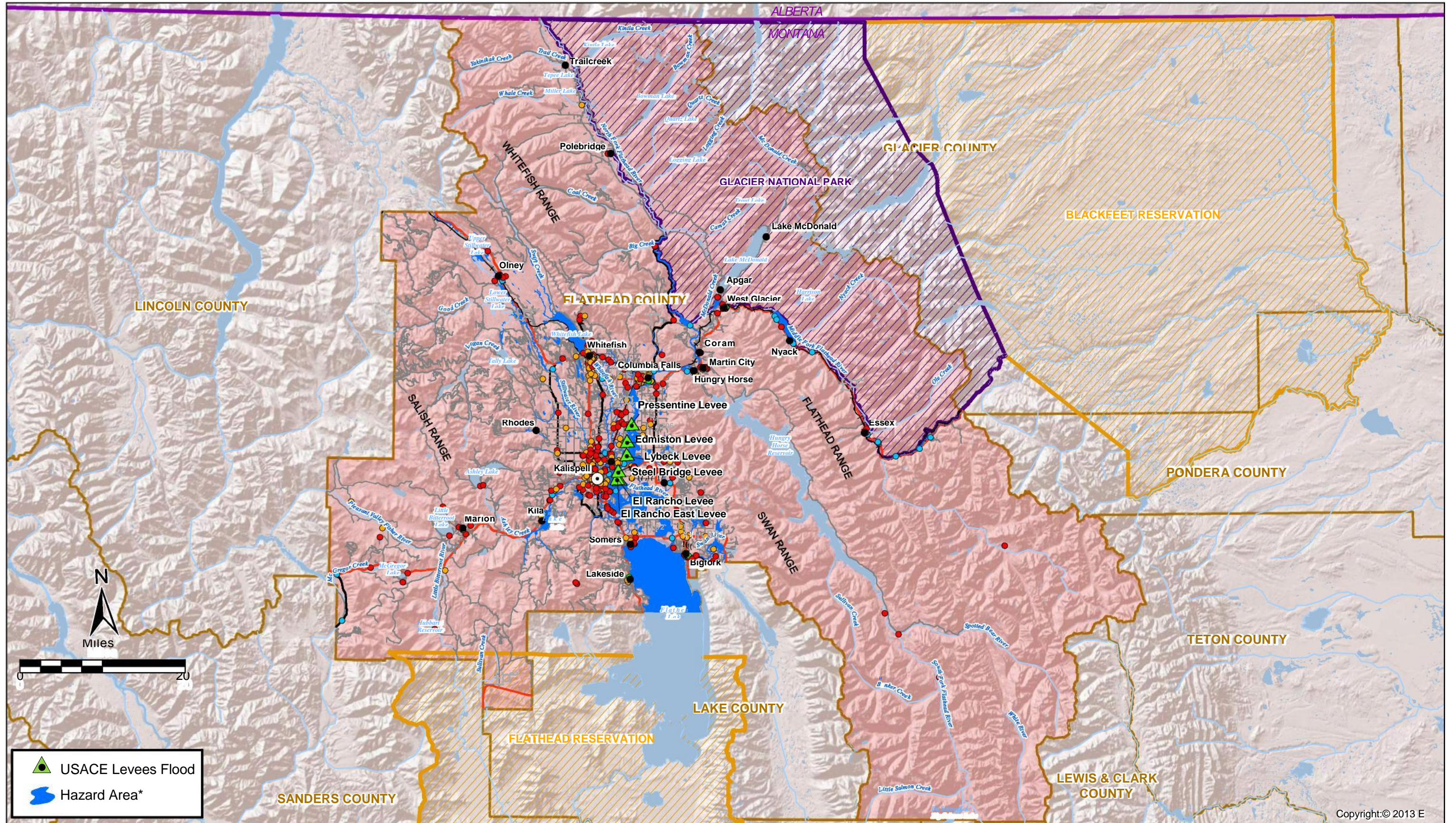
- Development in 100-year floodplains should be managed to avoid and mitigate environmental impacts and natural hazards.
  - Filling of the 100 year floodplain should be avoided.
- Recommendations:
- Protect the 100-year floodplain through implementation of the National Flood Insurance Program for both the City and the County.

The City of Columbia Falls implemented a back flow prevention program which helps mitigate property damage from flooding.

Flathead County Zoning Regulations (2012) and the Canyon Area Land Use Regulatory System (2004) stipulate that structures shall not be located in a 100-year floodplain (floodway and flood fringe).

Neighborhood Plans for Ashley Lake, Bigfork, Helena Flats, Lakeside, North Fork, Riverdale and The Canyon identify goals and policies associated with the flood hazard.

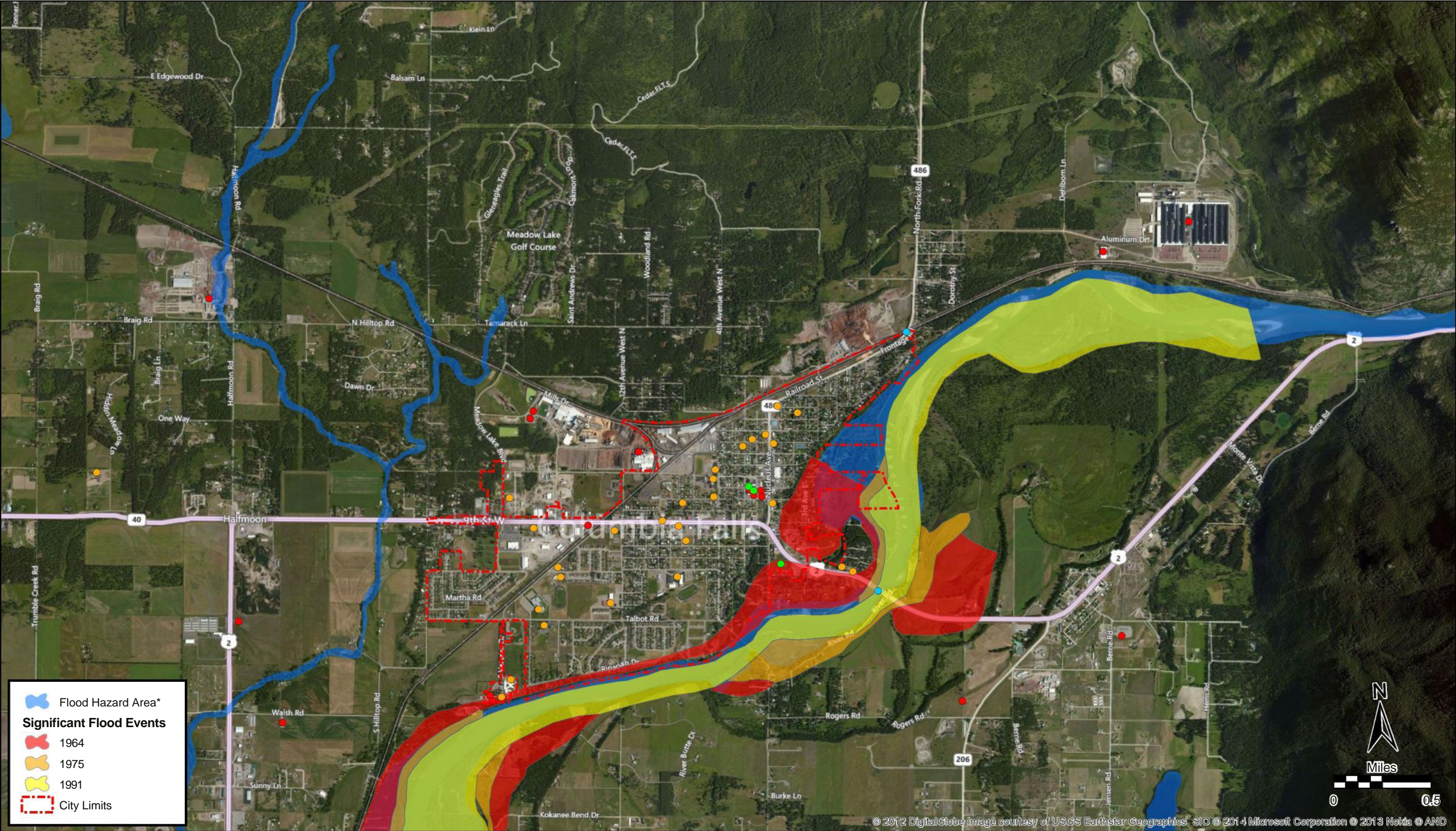
The Flathead City-County Health Department, which issues permits for all on-site sewage disposal systems, does not allow a system in or within 100 feet of a designated 100-year floodplain because of Department of Environmental Quality (DEQ) requirements that septic systems be 100 feet from surface water.



\*Flood Hazard Area as determined by county DFIRM (Digital Flood Insurance Rate Maps) for a 100-yr flood event.



- |               |                         |                   |                  |                               |
|---------------|-------------------------|-------------------|------------------|-------------------------------|
| ● County Seat | ● Critical Facility     | — Primary Route   | — River/Stream   | Indian Reservation            |
| ● Place Names | ● Vulnerable Population | — Secondary Route | — Lake/Reservoir | National Park                 |
|               | ● Other                 | — Other Route     |                  | County                        |
|               | ● Bridges               | — Railroads       |                  | United States - Canada Border |

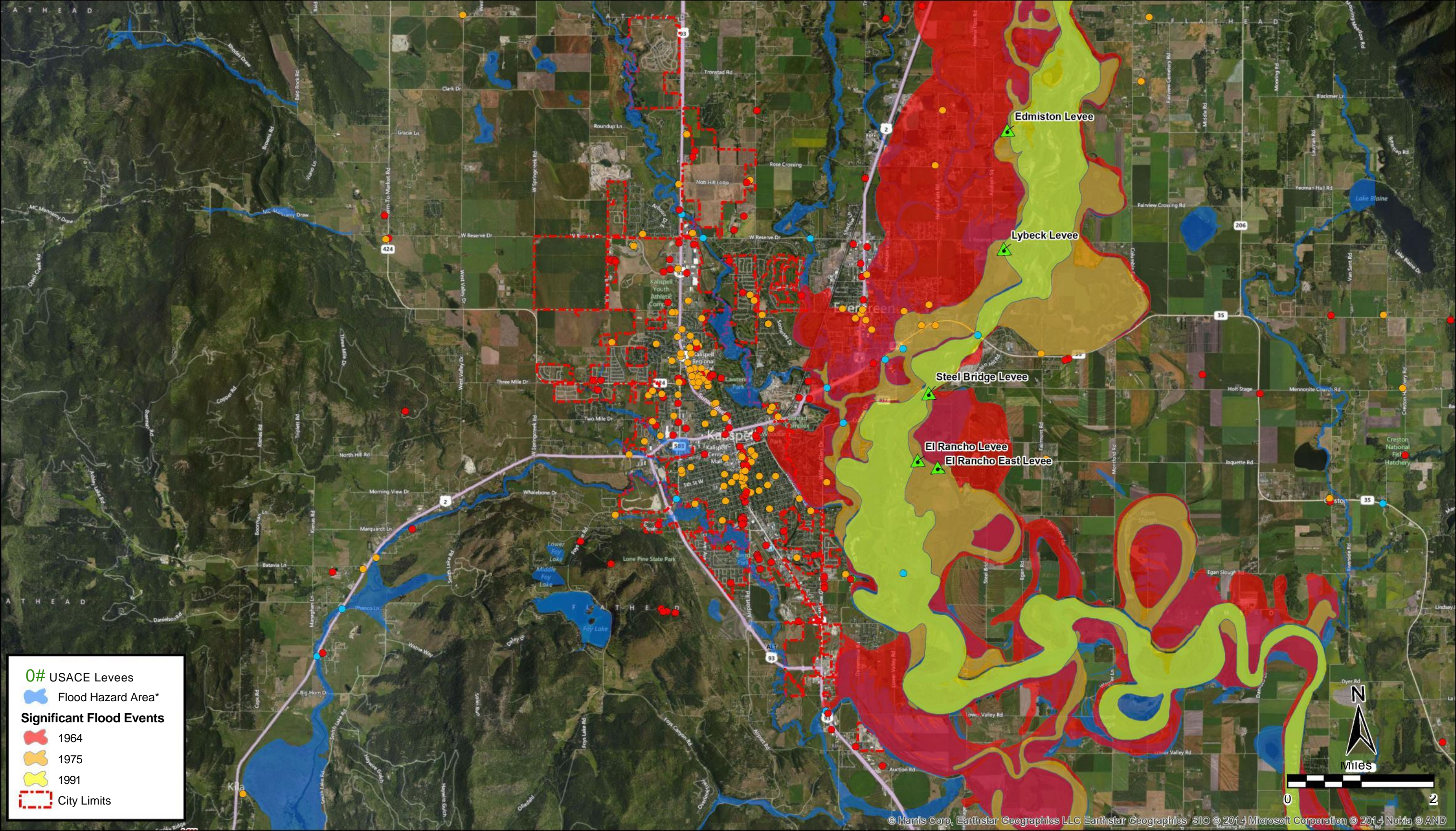


\*Flood Hazard Area as determined by county DFIRM (Digital Flood Insurance Rate Maps) for a 100-yr flood event.



● Critical Facility	● Other
● Vulnerable Population	● Bridges

May 2014  
Figure 7A  
Flood Prone Terrain - Columbia Falls  
Flathead County  
Pre-Disaster Mitigation Plan

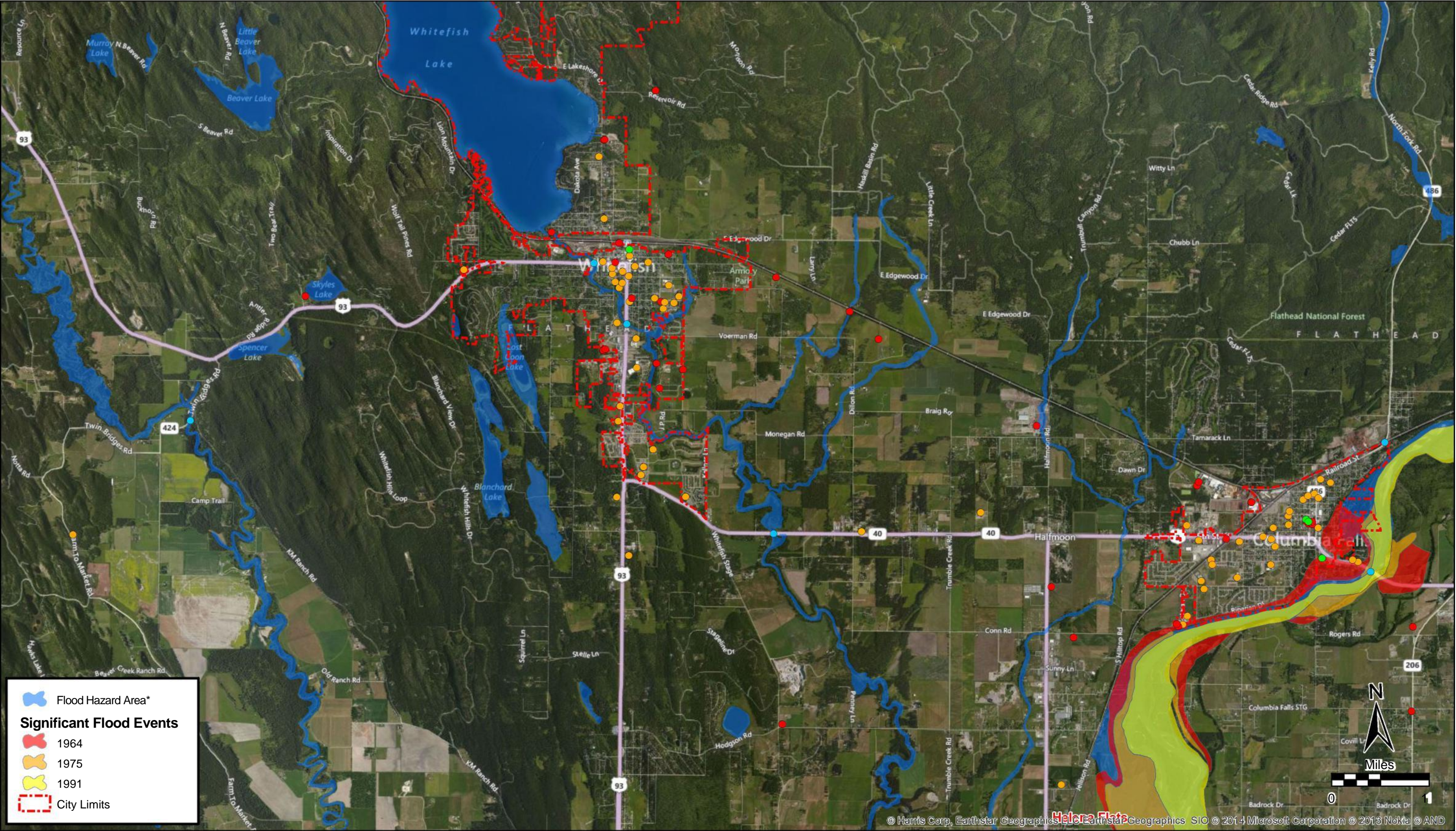


\*Flood Hazard Area as determined by county DFIRM (Digital Flood Insurance Rate Maps) for a 100-yr flood event.



● Critical Facility	● Other
● Vulnerable Population	● Bridges

May 2014  
Figure 7B  
Flood Prone Terrain - Kalispell  
Flathead County  
Pre-Disaster Mitigation Plan



\*Flood Hazard Area as determined by county DFIRM (Digital Flood Insurance Rate Maps) for a 100-yr flood event.



● Critical Facility	● Other
● Vulnerable Population	● Bridges

May 2014  
**Figure 7C**  
**Flood Prone Terrain- Whitefish**

**TABLE 4.3-3**  
**FLATHEAD COUNTY VULNERABILITY ANALYSIS – FLOODING**

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE\$	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE\$	# COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK\$	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE\$	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
<b>Incorporated Communities &amp; County</b>										
Columbia Falls	\$4,627,771	24	\$0	0	\$0	0	\$0	0	500	100
Kalispell	\$12,025,723	56	\$1,220,620	8	\$241,180	1	\$0	0	2,120	486
Whitefish	\$54,556,085	201	\$17,773,297	37	\$0	2	\$616,908	3	1,533	327
Remainder of County	\$495,843,950	1,822	\$24,995,530	50	\$0	1	\$12,388,28	43	17,030	3,930
<b>Census Designated Places</b>										
Batavia	\$3,155,807	19	\$1,525,996	5	\$0	1	\$91,436	2	239	70
Bigfork	\$105,534,700	485	\$53,310,884	208	\$0	2	\$769,328	3	2,175	353
Coram	\$1,095,576	7	\$0	0	\$0	0	\$12,360,00	1	76	13
Evergreen	\$150,043,842	720	\$89,550,375	194	\$971,782	3	\$2,660,278	10	5,796	1,503
Forest Hill Village	\$1,051,268	5	\$1,462,396	1	\$0	0	\$0	0	59	16
Helena Flats	\$33,169,687	137	\$1,808,852	5	\$0	0	\$0	0	758	203
Hungry Horse	\$4,877,920	19	\$0	0	\$0	0	\$0	0	180	34
Kila	\$0	0	\$0	0	\$0	0	\$0	0	21	0
Lakeside	\$68,358,777	283	\$3,636,592	14	\$0	0	\$0	0	880	166
Little Bitterroot Lake	\$0	0	\$0	0	\$0	0	\$0	0	0	0
Marion	\$0	0	\$0	0	\$0	0	\$0	0	0	0
Martin City	\$625,895	4	\$0	0	\$0	0	\$0	0	43	9
Niarada	\$0	0	\$0	0	\$0	0	\$0	0	0	0
Olney	\$1,563,684	5	\$0	0	\$0	0	\$0	0	10	0
Somers	\$13,834,395	47	\$12,093,704	11	\$0	0	\$0	0	469	125
West Glacier	\$16,848,930	87	\$1,892,499	8	\$0	0	\$0	0	68	5